Transmission characteristics of one-dimensional photonic crystals fabricated using high-aspect-ratio Si etching

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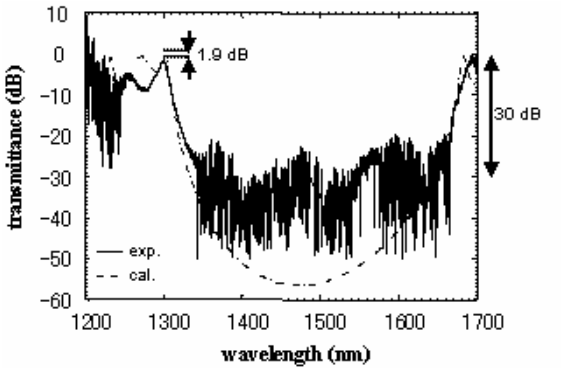
Using high-aspect-ratio Si etching, we made 1D photonic crystals consisting of silicon plates 300 nm thick and 10 μm deep. The high-aspect-ratio Si etching was achieved with cryogenic etching, in which the Si substrate was cooled to cryogenic temperature with liquid nitrogen. The measured transmission spectrum and the theoretically predicted spectra are shown in the figure. This figure shows that there was an obvious band gap (transmittance suppressed by greater than 30 dB) and a small transmission loss. The dash-dot-dash line in the figure shows the theoretically predicted spectrum calculated using the characteristic matrix method. The measured transmission spectrum is well reproduced by spectrum calculated for a 1D photonic crystal. This agreement confirms the formation of a high-quality 1D photonic crystal.



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